



**NOAA
FISHERIES**

**Southeast
Region**

Sawfish Bycatch in the Shrimp Fishery

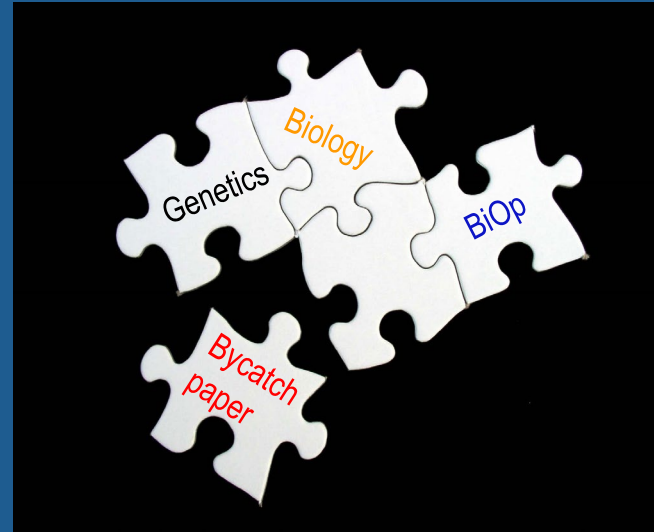


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Briefing for Shrimp AP Meeting
November 15, 2022

The concern...

- New data over the last 5 years present a bycatch concern for sawfish in the shrimp trawl fishery
- Pieces of the puzzle:
 - Sawfish life history
 - Limited observer coverage
 - 2021 biological opinion
 - Genetics manuscripts
 - 2022 bycatch manuscript
 - Recent reports of sawfish encounters
- SERO received a letter from the Smalltooth Sawfish Recovery Implementation Team voicing concern with this issue



“...sawfish caught in shrimp trawls are typically dragged for hours, resulting in substantially higher mortality than that associated with stationary nets and hooks. Despite this serious and well-known threat, observer coverage for Gulf of Mexico shrimp trawlers is extremely low (1-2%) and NMFS’ bycatch reporting requirements are insufficient to prompt sawfish encounter data from vessels without observers. The SSRIT has long been concerned over the resulting uncertainty that greatly hinders bycatch estimation and mitigation. This concern is heightened now that an analysis in the recent NMFS biological opinion for this fishery has extrapolated the highest annual sawfish capture estimates from already questionable observer data to calculate new levels of authorized capture (1806 over five years) at five times the previous limit.”

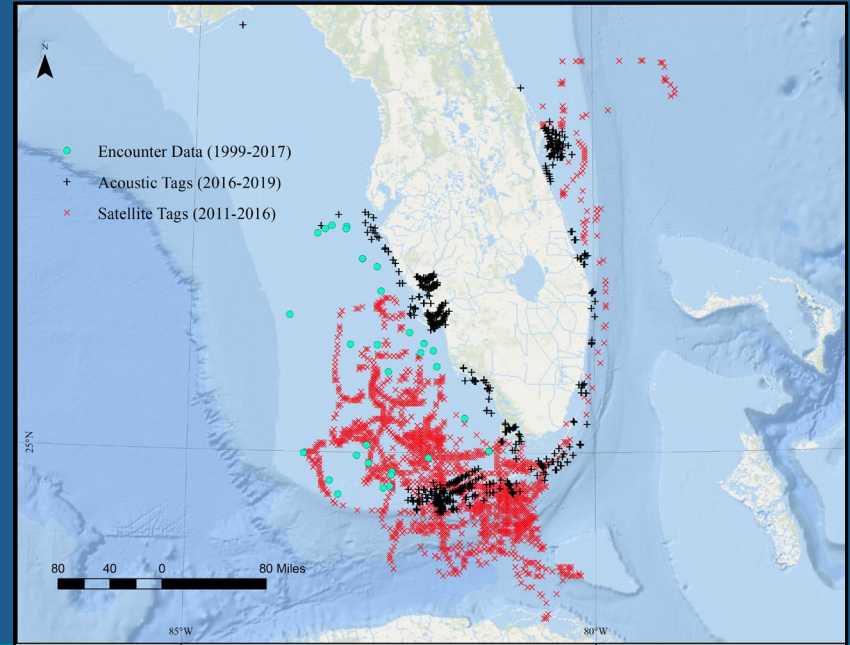
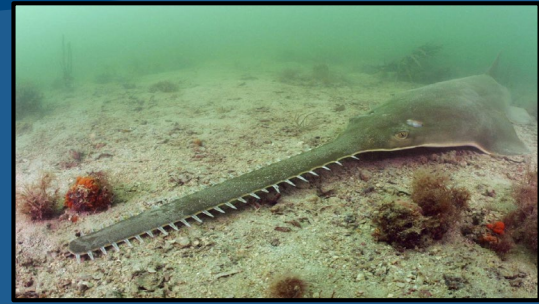
--SSRIT letter to NMFS

Life history

- Reproduce sexually and mothers give live birth
- Gestation period is 12 months
- Extended period of pupping – (peak April-June)
- Females reproduce every other year
- Brood size 7-14 young
- ~61 cm (2 feet) at birth
- Slow-growing (with the exception of early juveniles)
- Late-maturing (7-11 years at a length of ~12 feet)
- Long lifespan (~30 years)
- Grow up to 5 meters (16 feet)



Range and distribution



Data limitations

- Total effort for the shrimp fishery is very uncertain
 - Highly resolved positions but limited participation and technology issue (3G)
 - Limited logbook use restricts ability to derive effort
 - Effort is determined through landings data but does not account for where the vessel fished
- Data acquisition limited in comparison to other federal fisheries
- Low occurrence of sawfish interactions
 - Artifact of low observer coverage or truly a “rare” event?

Observer coverage

- 1-2% in shrimp fishery
- The basis for the ITS in the biological opinion
- Necessary for bycatch rates, survivability, and release techniques
- Limited data (15 reported captures) results in great extrapolation and high uncertainty

Biological Opinion

- ITS - 1806 captures over 5 years
(mid points of extrapolated data for GOM (21-331/yr) and SA (129-207/yr) + 5% pop rate increase)
- ITS - **903** mortalities over 5 years
(Avg = **180/year**)
- No requirements for reporting
- Difficult to identify and reach reinitiation triggers



Analysis for Shrimp Biological Opinion

- Only considered statistical zones 1-4 (Gulf) and 24-30 (SA), 2007-2019
- Extrapolated bycatch based on CPUE from 15 observed captures
 - GOM: 21-331/yr (mid point 176/yr)
 - SA: 129-207/yr (mid point 168/yr)
- Caveats presented by the lead analyst:
 - The ratio estimator (CPUE) used did not correct for spatial or temporal changes in shrimp observer effort
 - CPUE and effort estimates should be interpreted with caution--in some instances the bootstrap distribution failed to estimate confidence limits because of the extremely low number of positive observations
- Sawfish captures still appear to be rare for this fishery with the frequency of occurrence of captures $<1\%$

--Carlson 2020



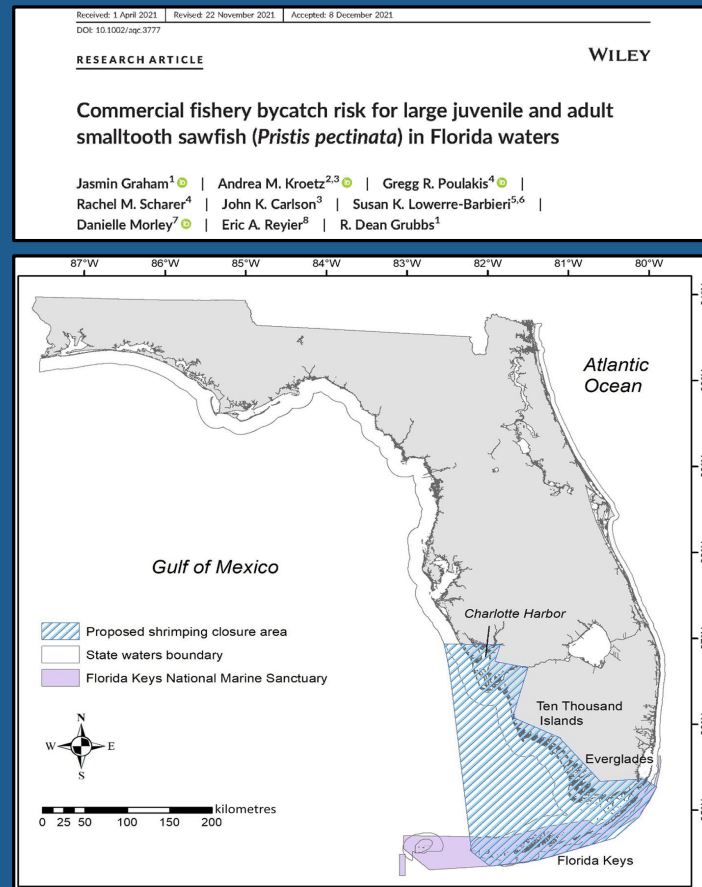
Genetic information

- Reconstruction of parental genotypes from juvenile samples
 - **55** females contributed to the 349 juveniles sampled between 2004 and 2015 in Charlotte Harbor (Feldheim et al. 2017)
 - **71** females contributed to the 310 juveniles sampled between 2000 and 2015 in Everglades/Ten Thousand Islands (Smith et al. 2021)
- Parturition site fidelity - generally use the same nursery to give birth
- Only **126** individual females are known to have contributed to the majority of all juveniles caught in sampled nurseries
 - Does not account for nursery sites in Florida Bay or the southern Everglades



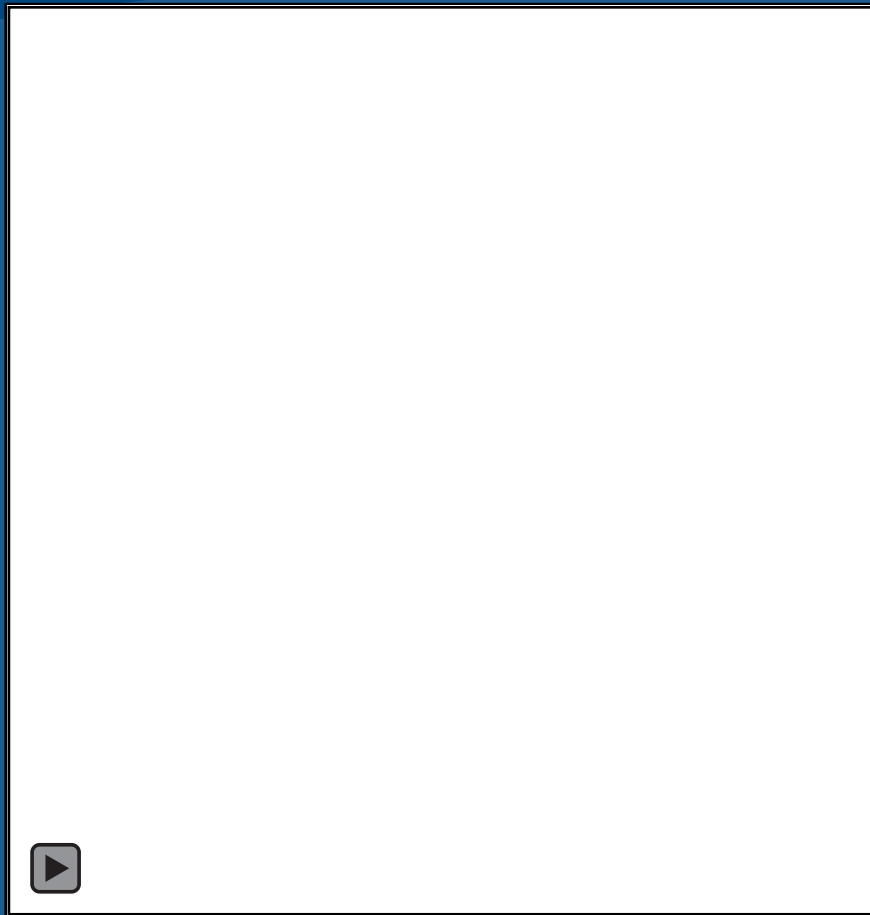
Bycatch manuscript

- Compared fisheries (shark bottom longline, SE coastal gillnet, shrimp trawl) overlap with sawfish habitat use in Florida
- Findings:
 - Shrimp fishery has greatest spatiotemporal overlap and poses highest bycatch risk
 - Females at higher risk - depth
- Author recommendations:
 - Increased observer coverage (possibly using Electronic Monitoring)
 - Year-round closure



Where do shrimp trawl effort and sawfish adult habitat use overlap?

Analysis of non-confidential shrimp eLB
tow hours relative to kernel density
estimates from pooled sawfish encounter
and tag relocation data.



Recent OLE cases

- Jacksonville case - (7/18/2018) Captain filmed using a circular saw to remove rostrum
- Tampa Bay - (9/2019) Shrimp boat entering Tampa Bay found with fresh rostrum
- Florida Keys - (1/18/2022) Crew removed the rostrum prior to release with an observer on board



So what's it all mean?

- Improper handling by shrimp fishermen continues within the industry
- The most recent biological opinion (2021) estimated an average of 180 sawfish could be killed per year by the shrimp fishery
 - Females may be more susceptible (Graham et al. 2022)
 - Given life history, just a few female losses could have large impacts
- As few as 126 females contributed to the juvenile sawfish population in SW FL over 15 years
 - A slight underestimate based on limited sampling in southern Everglades/Florida Bay
 - Fair estimate for Charlotte Harbor and Ten Thousand Islands based on current sampling there and parturition site fidelity
- Lack of reporting requirements and limited observer coverage within the fishery restrict our ability to effectively manage the recovery of this species
 - EM has the potential to increase observer coverage (Moncrief-Cox et al.2020)



Next steps

- How can we address current data limitations?
 - Electronic monitoring
 - More comprehensive electronic logbook program
 - Increased observer coverage (particularly in the areas of overlap - SW FL)
 - Voluntary reporting of sawfish interactions
- How can we raise awareness of safe handling and release guidance?
- How can sawfish bycatch and mortality be reduced in the fishery?